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OFFICIAL AMENDMENT

OFFICIAL AMENDMENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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OCT 15 2002

Application of

Applicants : David R. Hembree et al. ✓

Serial No. : 09/510,828 ✓

Filed : February 23, 2000 ✓

Title : A SPRING ELEMENT FOR USE IN AN APPARATUS FOR ATTACHING
TO A SEMICONDUCTOR AND A METHOD OF MAKING ✓

Docket No. : MIO0020VA (97-0198.02) ✓

Examiner : J. Mitchell

Art Unit : 2822

Confirmation : 4071

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Assistant Commissioner for Patents
Washington, D.C. 20231

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Thomas E. Lees

46,867
Reg. No.

Sir:

AMENDMENT

This paper is being filed in response to the Office Action dated July 31, 2002 in the identified application, having a reply due date of October 31, 2002. Reconsideration is respectfully requested in light of the remarks below.

IN THE CLAIMS

The entire set of presently pending claims is reproduced below for the convenience of the Examiner. Amended claims are indicated as such in the parenthetical following the claim number. Further, enclosed herewith is a separate paper entitled "Version With Markings To Show Changes Made" which corresponds to the amendments to the claims made herein.

00/FB/2002 TBELL1 00000007 09510828

01 FC:1202
02 FC:1201

270.00 OP

84.00 OP

Please amend claims 29, 54, 68 and 73.

Please also add new claims 74-88.

FACSIMILE TRANSMISSION

To: J. Mitchell
Company: Patent and Trademark Office
Fax no: ~~703-305-3432~~ 703-308-7724
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Patents, Trademarks and Related Matters

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PTO/SB/17 (11-01)

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FEE TRANSMITTAL

for FY 2002

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 210.00

Complete if Known

Application Number 09/510,828
 Filing Date February 23, 2000
 First Named Inventor David R. Hembree
 Examiner Name J. Mitchell
 Group Art Unit 2822
 Attorney Docket No. MIO 0020 VA

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit card ☐ Money Order ☐ Other ☐ None
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 Deposit Account Number
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- ☐ Charge fee(s) indicated below ☐ Credit any overpayments
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FEE CALCULATION

1. BASIC FILING FEE

Large Entity / Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)		
101	740	Utility filing fee	
106	330	Design filing fee	
107	510	Plant filing fee	
108	740	Reissue filing fee	
114	160	Provisional filing fee	

SUBTOTAL (1) (\$) 0.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Extra Claims		Fee from below		Fee Paid
Total Claims	Independent Claims			
59	8	-20** = 15	x 18.00 = 210.00	
		-3** = 0	x 84.00 = 0.00	
Multiple Dependent				

Large Entity / Small Entity		Fee Description
Fee Code	Fee (\$)	
103	18	Claims in excess of 20
102	84	Independent claims in excess of 3
104	280	Multiple dependent claim, if not paid
109	84	** Reissue independent claims over original patent
110	18	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$) 210.00

**or number previously paid, if greater. For Reissues, see above.

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for <i>ex parte</i> reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	920	217	460	Extension for reply within third month	
118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	
121	280	221	140	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
143	480	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17(q)	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify):

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 0.00

SUBMITTED BY

Name (Print/Type) Thomas E. Leger

Signature

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(Attorney/Agent)

Complete (if applicable)

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Date October 15, 2002

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29. (Amended) An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

el an attachment device comprising a spring element including an elastic member comprised of a first elastomeric material and a conductive member, said attachment device arranged to press said semiconductor between said spring element and said interconnect structure to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device.

30. The apparatus of claim 29, wherein said conductive member comprises a plurality of conductive particles.

31. The apparatus of claim 29, wherein said plurality of conductive particles are interspersed within said elastomeric member.

36. The apparatus of claim 29, wherein said conductive member is comprised of conductive material selected from the group consisting of gold, aluminum, nickel, silver stainless steel, and alloys thereof.

37. The apparatus of claim 29, wherein said semiconductor is electrically biased through said spring element.

38. The apparatus of claim 29, wherein said semiconductor comprises a semiconductor die.

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39. The apparatus of claim 29, wherein said semiconductor comprises a semiconductor die formed within a semiconductor package.

40. The apparatus of claim 39, wherein said semiconductor package comprises a package selected from the group consisting of a chip-scale package, a ball grid array, a chip-on-board, a direct chip attach, and a flip-chip.

44. An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

an attachment device arranged to press said semiconductor against said interconnect structure to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including a conductive member and a first elastic member comprised of a first elastomeric material having first force transfer characteristics, said first elastic member having a plurality of holes formed therein such that said spring element has overall force transfer characteristics different from said first force transfer characteristics.

45. The apparatus of claim 44, wherein said spring element further comprises an elastic member comprised of a second elastomeric material having second force transfer characteristics, said second elastic member positioned in at least one of said plurality of holes formed in said first elastic member such that said overall force transfer characteristics are different from said first and second force transfer characteristics.

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46. The apparatus of claim 44, wherein said spring element further comprises a plurality of second elastic members positioned in a plurality of said plurality of holes in said first elastic member.

47. The apparatus of claim 44, wherein said conductive member comprises a plurality of conductive particles.

50. An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

an attachment device arranged to press said semiconductor against said interconnect structure to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including an elastic member comprised of a conductive member and an elastomeric material having first force transfer characteristics, said first elastic member having at least one hole formed therein such that said spring element has overall force transfer characteristics different from said first force transfer characteristics, said elastic member being shaped so as to engage an outer edge of said semiconductor such that a force applied by said attachment device as said semiconductor is pressed by said attachment device against said interconnect structure is substantially uniform around said semiconductor.

51. The apparatus of claim 50, wherein said conductive member comprises a plurality of conductive particles.

54. (Amended) An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

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an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

an attachment device arranged to press said interconnect structure against said semiconductor to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including a first conductive member, a first elastic member and a second elastic member, said first elastic member comprising a first elastomeric material having first force transfer characteristics and said second elastic member comprising a second elastomeric material having second force transfer characteristics, said second elastic member being positioned within said first elastic member such that said spring element has overall force transfer characteristics different from said first and second force transfer characteristics.

55. The apparatus of claim 54, further comprising a plurality of said second elastic members formed within said first elastic member.

56. The apparatus of claim 54, wherein said conductive member comprises a plurality of conductive particles.

63. An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

an attachment device arranged to press said semiconductor against said interconnect structure to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including a conductive member and an elastic member comprised of an elastomeric material having first force transfer characteristics,

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said elastic member having at least one cavity formed therein such that said spring element has overall force transfer characteristics different from said first transfer characteristics of said elastomeric material.

64. The apparatus of claim 63, wherein said elastic member has a plurality of cavities formed therein.

65. The apparatus of claim 63, wherein said conductive member comprises a plurality of conductive particles.

68. (Amended) An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

an attachment device arranged to press said interconnect structure against said semiconductor to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including a conductive member and an elastic member having a variable spring constant.

69. The apparatus of claim 68, wherein said conductive member comprises a plurality of conductive particles.

73. (Amended) An apparatus for attaching to a plurality of contacts of a semiconductor, said apparatus comprising:

an interconnect structure comprising a plurality of conductors patterned to match corresponding ones of said plurality of contacts of said semiconductor; and

E4
end
an attachment device arranged to press said semiconductor against said interconnect structure to provide an electrical connection between said plurality of conductors and said corresponding ones of said plurality of contacts, said attachment device comprising a spring element including an elastic member comprised of a first elastomeric material, and a conductive member, wherein said conductive member comprises carbon.

Please add the following new claims:

ES
74. (New) The apparatus of claim 44, wherein said conductive member comprises a plurality of conductive particles interspersed within said elastomeric member.

75. (New) The apparatus of claim 44, wherein said semiconductor is electrically biased through said spring element.

76. (New) The apparatus of claim 50, wherein said conductive member comprises a plurality of conductive particles interspersed within said elastomeric member.

77. (New) The apparatus of claim 50, wherein said semiconductor is electrically biased through said spring element.

78. The apparatus of claim 54, wherein said conductive member comprises a plurality of conductive particles interspersed within said elastomeric member.

79. (New) The apparatus of claim 54, wherein said semiconductor is electrically biased through said spring element.

80. (New) The apparatus of claim 63, wherein said conductive member comprises a plurality of conductive particles interspersed within said elastomeric member.

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81. (New) The apparatus of claim 63, wherein said semiconductor is electrically biased through said spring element.

82. (New) The apparatus of claim 68, wherein said conductive member comprises a plurality of conductive particles interspersed within said elastomeric member.

83. (New) The apparatus of claim 68, wherein said semiconductor is electrically biased through said spring element.

ES
end 84. (New) The apparatus of claim 68, wherein said spring element includes an elastic member having a cross-section defined by at least one peak, wherein said elastic member exhibits a variable spring constant that changes with a degree of compression of said at least one peak.

85. (New) The apparatus of claim 68, wherein said elastic member has a triangular shaped cross-section.

86. (New) The apparatus of claim 68, wherein said elastic member has a repeating triangular shaped cross-section.

87. (New) The apparatus of claim 68, wherein said elastic member has a diamond shaped cross-section.

88. (New) The apparatus of claim 68, wherein said elastic member has a repeating diamond shaped cross-section.

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REMARKS

Claims 29-31, 36-40, 44-47, 50, 51, 54-56, 63-65, 68, 69, and 73 are pending in the present application. Claims 54, 68, 29, and 73 have been amended, and new claims 74-88 have been added herein.

Rejection Under 35 U.S.C. §102(e)

Claims 29-31 and 36-39 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,046,060 issued April 04, 2000 to Budnaitis et al. (hereinafter "Budnaitis"). According to the M.P.E.P. §706.02, in order to be anticipating under §102, the reference must teach every aspect of the claimed invention. See Carella v. Starlight Archery and Pro Line Co., 804 F.2d 135, 138, 231 U.S.P.Q. 644, 646 (Fed. Cir. 1986).

With regard to independent claim 29 as amended herein, the Applicants believe that the Examiner has not met the burden of establishing a *prima facie* case of anticipation under 35 USC §102 because Bundaitis fails to teach an attachment device arranged to press the semiconductor *between* the spring element and the interconnect structure to provide an electrical connection.

As best seen in Figs. 2-4 of Bundaitis, a test device 6 provides test signals carried from the test signal generator 10 to the base unit 7. A selectively conductive elastomer 8 temporarily electrically couples the terminals 13 on the base unit 7 to the pads 20 of the contact sheet 9 (Col. 8, lines 8-15). The contact sheet 9 is further arranged to couple directly to the contacts the semiconductor 1. As such, the test device 6 is not arranged to press the semiconductor *between* a spring element and an interconnect structure as claimed herein.

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Budnaitis fails to teach every limitation of claim 29. Accordingly, the applicants request the Examiner withdraw the above rejection of claim 29, and the claims that depend therefrom including claims 30-31 and 36-39.

35 U.S.C. §103(a)

Claim 40 was rejected under 35 U.S.C. §103(a) as being anticipated by Budnaitis in view of U.S. Patent No. 6,229,320 issued to Haseyama et al. (hereinafter "Haseyama"). According to the MPEP §706.02(j), in order to establish a *prima facie* case of obviousness, the prior art reference must teach or suggest all the claim limitations.

With regard to independent claim 40 as amended herein via the amendment to base claim 29, the Applicants believe that the Examiner has not met the burden of establishing a *prima facie* case of obviousness under 35 USC §103 because Budnaitis combined with Haseyama fails to teach an attachment device arranged to press the semiconductor *between* the spring element and the interconnect structure to provide an electrical connection where the spring element comprises an elastomeric material and a conductor.

As pointed out above, Budnaitis does not teach all of the limitations of claim 29, and thus does not teach all of the limitations of claim 40 as claim 40 depends from claim 29. Haseyama does not teach the use of an elastomeric spring at all. Rather, a "spring action" is achieved in Haseyama using metal contact pins 30. See for example, Col. 6, lines 43-48. See also, Figs. 23A-23D. As pointed out at Col. 16, lines 13-17, the contact pins 30 have an arcuate part 66 to provide the "spring action".

Budnaitis combined with Haseyama fails to teach every limitation of claim 40 thus the Applicants request the Examiner withdraw the above rejection.

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Allowable Subject Matter

With regard to the objection to Claim 73, the applicants have rewritten the claim in independent form including all of the limitations of the base claim 29 per the Examiner's suggestion. As such, the applicants request the Examiner withdraw the objection.

With regard to the new claims added herein, each of the added claims is dependent upon a base claim that has already been determined allowable.

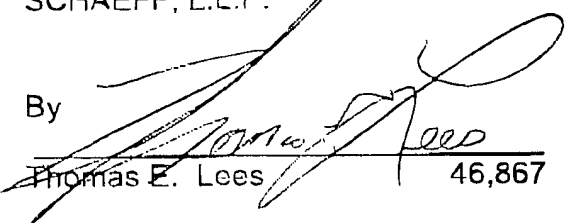
The applicants thank the Examiner for the early indication of allowable subject matter.

CONCLUSION

For all of the above reasons, the applicants respectfully submit that the above claims represent allowable subject matter. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
KILLWORTH, GOTTMAN, HAGAN &
SCHAEFF, L.L.P.

By


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